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DEVICE FOR PREPARING REPAIR PLAN

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Specification

1. Title of the invention

DEVICE FOR PREPARING REPAIR PLAN

2. Claims

/2

1. A device for preparing a repair plan, characterized by being equipped with an input means that inputs a degradation diagnosis data diagnosed in advance for each of several degradation items for each of several parts of a structure being constituted by said parts for several kinds and the quantity of each part; a degradation state estimation means that converts the above-mentioned degradation state diagnosis data into the degree of degradation for relatively comparing several degradation items for each part and estimates the degradation state of the structure based on the relationship between the degradation items and the above-mentioned degree of degradation; a repair specification selection means that selects a repair specification corresponding to a repair grade selected based on the above-mentioned degradation state among several repair specifications stored in advance for each grade; a repair

¹ Numbers in the margin indicate pagination in the foreign text.

schedule plan preparation means that totals the quantity of each part for each kind of part and prepares a schedule plane including a repair quantity and a repair specification being applied at each year up to a preset year based on a service life corresponding to the above-mentioned repair specification; a repair expense plan preparation means that attains a yearly repair quantity of the repair being applied at each year up to the above-mentioned preset year, attains a repair expense $A = B \cdot C$ required each year by using a preset repair unit price as C , calculates a predicted repair expense Y in which the price rise rate α being predicted for each year is added to said repair expense Y , calculates the total predicted repair expense X up to the above-mentioned preset year by totaling the predicted repair expense Y at each year, and prepares an expense plan for the repair being applied each year; a repair estimate preparation means that reads the quantity and the repair specification for the repair being applied at a designated year out of the above-mentioned repair schedule plan preparation means, reads the expense for the repair being applied to the designated year out of the above-mentioned repair expense plan preparation means, and prepares a repair estimate including the read quantity, repair specification, and expense, and prepares a construction work specification including a construction work sequence based

on the read repair specification; and an output means that outputs the estimation result of the above-mentioned degradation state, the schedule plan, the expense plan, the repair estimate, and the construction work specification.

2. The device for preparing a repair plan of Claim 1, characterized by the fact that the above-mentioned repair expense plan preparation means prepares an income and expenditure plane up to the above-mentioned preset year from the income due to an existing repair money held in stock and a temporary money collected or borrowed when the repair money held in stock is deficient and the expenditure due to a repair expense for the repair being applied each year and the repayment based on a temporary money and its interest.

3. The device for preparing a repair plan of Claim 1, characterized by the fact that the above-mentioned repair expense plan preparation means calculates a share ratio $D = D2/D1$, assuming that the total value of the occupied area of all users as $D1$ and the occupied area of one user as $D2$, when the structure is divided and used by several users and then calculates a predicted repair expense $Z = Y \cdot D$ per one user.

4. The device for preparing a repair plan of Claim 1, characterized by the fact that the above-mentioned output means outputs the relationship between the above-mentioned degradation

items and the degree of degradation as a bar graph in which a scale corresponding to the degree of degradation is vertically given to a preset reference line and the degree of degradation for each degradation item is arranged at an equal interval on the above-mentioned reference line or a radar chart graph in which a scale corresponding to the degree of degradation is radially given from a preset base point and the degree of degradation for each degradation item is arranged at an equal interval on the circumference around the above-mentioned base point.

5. The device for preparing a repair plan of Claim 1, characterized by the fact that the above-mentioned output means outputs the above-mentioned expense plan as a bar graph.

6. The device for preparing a repair plan of Claim 1, characterized by the fact that the above-mentioned output means divides the construction work sequence of the above-mentioned construction work specification into several processes and outputs them.

7. The device for preparing a repair plan of Claim 6, characterized by the fact that the above-mentioned output means outputs the construction work content being carried out in each process given to the above-mentioned divided each process as a

flow chart consisting of concisely expressed construction work names.

8. The device for preparing a repair plan of Claim 6, characterized by the fact that the above-mentioned output means also outputs figures showing construction work methods being applied to the above-mentioned divided each process.

9. The device for preparing a repair plan of Claim 6, characterized by the fact that the above-mentioned output means also outputs a table showing construction work conditions being applied to the above-mentioned divided each process.

3. Detailed explanation of the invention

[0001]

(Industrial application field)

The present invention pertains to a device for preparing a repair plan that can prepare a repair plan of a structure over a long term.

[0002]

(Prior art)

Structures exposed to wind and rail for one year are repeatedly affected by external degradation factors such as direct sunlight, air pollution, acidic rain, cold temperature difference, freezing, and vibration, and in several parts

constituting said structures, various degradations such as degradation of pollution, rust generation, and coated films, neutralization of concrete body surface parts, and steel bar explosion cracks, rise, and peeling-off of steel-reinforced concretes are caused. In order to secure the functionality and safety of the structures and to preserve the asset value, an overall degradation state must be precisely decided, and measures based on the decision results must be taken. For this reason, each part is diagnosed for each degradation item such as pollution and rust generation, and the degradation state is decided. In prior arts, these diagnosis and decision are made each time the necessity of a repair is generated.

[0003]

(Problems to be solved by the invention)

The diagnosis of the degradation state is a work that requires considerable labor and time, and if the diagnosis is carried out each time the necessity of a repair is generated as mentioned above, further labor and time are required.

[0004] Also, a large amount of expense is required for a repair, and if the expense required for a repair being carried out for/3 several years, an expense plan can be prepared, which is favorable for a person who requests the repair. However, in the prior arts, since the necessity of a certain repair at a certain

time is not clearly understood in the prior arts, the expense for the purpose is not certain, either. For example, in collective housings such as mansions, management expenses being used in repair expenses, etc., are collected every month from residents. As mentioned above, if the necessity of a certain repair at a certain time is not certain and the expense for the purpose is also not certain, the expense is insufficient at a repair step, regardless of an optimum amount of money being collected as the above-mentioned management expenses, and the shortage amount must be collected as a temporary money. This temporary money collection imposes a large burden on the residents. Also, even if the above-mentioned management expenses are raised not to collect a temporary money, since a repair is required at a certain time and the amount required for the repair is not clearly understood, the explanation being understood by the residence is impossible, causing a trouble.

[0005] The purpose of the present invention is to provide a device for preparing a repair plan that can easily repair a repair plan of a structure over a long term.

[0006]

(Means to solve the problems)

The present invention is a device for preparing a repair plan characterized by being equipped with an input means that

inputs a degradation diagnosis data diagnosed in advance for each of several degradation items for each of several parts of a structure being constituted by said parts for several kinds and the quantity of each part; a degradation state estimation means that converts the above-mentioned degradation state diagnosis data into the degree of degradation for relatively comparing several degradation items for each part and estimates the degradation state of the structure based on the relationship between the degradation items and the above-mentioned degree of degradation; a repair specification selection means that selects a repair specification corresponding to a repair grade selected based on the above-mentioned degradation state among several repair specifications stored in advance for each grade; a repair schedule plan preparation means that totals the quantity of each part for each kind of part and prepares a schedule plane including a repair quantity and a repair specification being applied at each year up to a preset year based on a service life corresponding to the above-mentioned repair specification; a repair expense plan preparation means that attains a yearly repair quantity of the repair being applied at each year up to the above-mentioned preset year, attains a repair expense $A = B \cdot C$ required each year by using a preset repair unit price as C, calculates a predicted repair expense Y in which the price rise

rate α being predicted for each year is added to said repair expense Y, calculates the total predicted repair expense X up to the above-mentioned preset year by totaling the predicted repair expense Y at each year, and prepares an expense plan for the repair being applied each year; a repair estimate preparation means that reads the quantity and the repair specification for the repair being applied at a designated year out of the above-mentioned repair schedule plan preparation means, reads the expense for the repair being applied to the designated year out of the above-mentioned repair expense plan preparation means, and prepares a repair estimate including the read quantity, repair specification, and expense, and prepares a construction work specification including a construction work sequence based on the read repair specification; and an output means that outputs the estimation result of the above-mentioned degradation state, the schedule plan, the expense plan, the repair estimate, and the construction work specification. Also, it is characterized by the fact that the above-mentioned repair expense plan preparation means of the present invention prepares an income and expenditure plane up to the above-mentioned preset year from the income due to an existing repair money held in stock and a temporary money collected or borrowed when the repair money held in stock is deficient and the expenditure due

to a repair expense for the repair being applied each year and the repayment based on a temporary money and its interest. Also, it is characterized by the fact that the above-mentioned repair expense plan preparation means of the present invention calculates a share ratio $D = D2/D1$, assuming that the total value of the occupied area of all users as $D1$ and the occupied area of one user as $D2$, when the structure is divided and used by several users and then calculates a predicted repair expense $Z = Y \cdot D$ per one user. Also, it is characterized by the fact that the above-mentioned output means of the present invention outputs the relationship between the above-mentioned degradation items and the degree of degradation as a bar graph in which a scale corresponding to the degree of degradation is vertically given to a preset reference line and the degree of degradation for each degradation item is arranged at an equal interval on the above-mentioned reference line or a radar chart graph in which a scale corresponding to the degree of degradation is radially given from a preset base point and the degree of degradation for each degradation item is arranged at an equal interval on the circumference around the above-mentioned base point. Also, it is characterized by the fact that the above-mentioned output means of the present invention outputs the above-mentioned expense plan as a bar graph. Also, it is

characterized by the fact that the above-mentioned output means of the present invention divides the construction work sequence of the above-mentioned construction work specification into several processes and outputs them. Also, it is characterized by the fact that the above-mentioned output means of the present invention outputs the construction work content being carried out in each process given to the above-mentioned divided each process as a flow chart consisting of concisely expressed construction work names. Also, it is characterized by the fact that the above-mentioned output means of the present invention also outputs figures showing construction work methods being applied to the above-mentioned divided each process. It is characterized by the fact that the above-mentioned output means of the present invention also outputs a table showing construction work conditions being applied to the above-mentioned divided each process.

[0007]

(Operation)

According to the present invention, in preparing a repair plan, first, a degradation diagnosis data diagnosed in advance is input. The degradation diagnosis data is diagnosed for each of several degradation items for the above-mentioned each part of a structure being constituted from several parts for each of

several kinds. The input degradation diagnosis data is converted into the degree of degradation for relatively comparing several degradation items for each part, and the degradation state of the structure is estimated based on the relationship between the degradation items and the above-mentioned degree of degradation. A person who requests a repair selects the grade of the repair based on the above-mentioned estimated degradation state.

[0008] The repair corresponding to the grade of the selected repair is selected from several repair specifications stored in advance for each grade. Also, the quantity of the each part input is totaled for each kind of part, and based on the /4 service life corresponding to the above-mentioned repair specification, a schedule plan including the quantity of the repair being applied each year up to a preset year is prepared. Then, a yearly repair quantity B of the repair being applied each year up to the preset year is attained based on the above-mentioned schedule plan, and the repair expense $A = B \cdot C$ required each year is attained by using a preset repair unit price as C. Furthermore, a predicted repair expense Y in which a price rise rate α being predicted each year is added to said repair expense A is calculated, a predicted repair expense Y for each year is totaled, a total predicted repair expense X up to

the preset year is calculated, and an expense plan for the repair being applied each year is prepared. Thus, an expense plan for the repair is prepared.

[0009] If the prescribed year is designated, the quantity and the repair specification for the repair being applied at the designated year are read out of the above-mentioned schedule plan, and the expense for the repair being applied at the designated year is read out of the above-mentioned expense plan. Thus, a repair estimate including the read quantity, repair specification, and expense is prepared. Also, the repair specification for the repair being applied at the designated year is read out of the above-mentioned schedule plan, and a construction work specification including a construction work sequence is prepared based on the read repair specification. As a result of the estimation of the degradation state, the schedule plan, the expense plan, the repair estimate, and the construction work specification are output to the output means.

[0010] Thus, with the preparation of the schedule plan and the expense plan, the necessity of a certain repair at a certain time is understood, and the expense for the purpose is also clarified. For this reason, a person who requests the repair understands the plan on the repair of a structure over a long term in detail, and the preparation of required expense, etc.,

can be reliably carried out in advance. Since the above-mentioned expense plan has high reliability to which the price rise rate α is added, the expense for the repair for several years can be reliably prepared in advance. Also, the prepared estimate can be used in construction bid, etc. Furthermore, the work being carried out can be detected in detail by the prepared construction work specification.

[0011] Also, according to the present invention, as the above-mentioned repair expense, an income and expenditure plane up to the preset year is prepared from the income due to an existing repair money held in stock and a temporary money collected or borrowed when the repair money held in stock is deficient and the expenditure due to a repair expense for the repair being applied each year and the repayment based on a temporary money and its interest. With this income and expenditure plan, the requester can detect the expense plan in detail by the income and expenditure. Also, it is understood that the repair being repeated may be laid aside yearly or monthly, for instance, by several portions each. Furthermore, this income and expenditure is favorably utilized in the explanation when the amount of money laid aside for the repair is increased.

[0012] Also, according to the present invention, when the structure is divided and used by several users, the predicted

repair expense $Z = Y \cdot D$ per one user is calculated. The above-mentioned D is the share ratio $D = D2/D1$, $D1$ is the total value of the occupied area of all users, and $D2$ is the occupied area of one user. For example, when the structure is a collective housing such as mansion, the amount of money to be collected as management expenses being used for repair expenses, etc., from the users is clarified.

[0013] Also, according to the present invention, since the relationship between the above-mentioned degradation items and the degree of degradation is output as a bar graph or a radar chart graph, the degradation state of the structure can be easily confirmed with the naked eyes. With the output as a graph, several degradation items for each part can be easily relatively compared.

[0014] Also, according to the present invention, the above-mentioned expense plan is output as a bar graph. Thus, the plan for the repair of the structure over a long term can be easily detected with the naked eyes.

[0015] Also, according to the present invention, the construction work sequence of the above-mentioned construction work specification is divided into several processes and output. For example, the construction work content being carried out in each process given to the above-mentioned divided each process

is output as a flow chart consisting of concisely expressed construction work names. Also, figures showing construction work methods being applied to each process are output. Furthermore, a table showing construction work conditions being applied to each process is output. With the output as the above-mentioned flow chart, the construction work sequence can be easily detected with the naked eyes. Also, with the output of the figures showing construction work methods, a certain construction work can be easily detected with the naked eyes. Furthermore, with the output of the table showing construction work conditions, a certain construction work condition can be easily detected with the naked eyes.

[0016]

(Application example)

Figure 1 is a flow chart briefly showing the operation of a device 1 for preparing a repair plan of an application example of the present invention. Also, Figure 2 is a block diagram showing the constitution of the device 1 for preparing a repair plan. The device 1 for preparing a repair plan consists of control means 2, input means 2, memory means 4, display means 5, and printing output means 6. The control means 2 is realized by CPU (central processing unit), for instance, and repair specification, repair schedule plan, repair expense plan,

estimate, and construction work specification are prepared based on degradation diagnosis data, repair quantity data, and year designation data being input from the input means 3. The input means 3, for example, is realized by an input device with a readout means for optically reading characters described on a prescribed paper or an input device with several keys corresponding to alphabets or numerical values of 0-9.

[0017] The memory means 4 is realized by a ROM (read-only memory) and a RAM (random access memory), for instance. Operation programs of a processing being implemented by the control means 2, etc., are stored in the ROM, and repair specification, repair schedule plan, repair expense plan, estimate, and construction work specification are stored in /5 the RAM. The display means 5 is realized by CRT (cathode ray tube), for instance. The printing output means 6 is realized by including thermal head, etc., for printing on a prescribed recording paper, for instance. The repair specification, repair schedule plan, repair expense plan, estimate, and construction work specification prepared can be displayed on the display means 5 and can also be printed and output from the printing output means 6.

[0018] At step s1 of Figure 1, whether or not a degradation diagnosis data is input from the above-mentioned input means 3

is decided. If the degradation diagnosis data is input, the flow proceeds to step s2, and if the degradation diagnosis data is not input, the flow waits at step s1. At step s2, the control means 2 prepares a repair specification based on the degradation diagnosis data input. At step s3, whether or not a repair quantity data is input from the above-mentioned input means 3 is decided. If the repair quantity data is input, the flow proceeds to step s4, and if the repair quantity data is not input, the flow waits at step s3. At step s4, the control means 2 prepares a repair schedule plan and a repair expense plan based on the repair quantity data input. At step s5, whether or not a prescribed year is designated by a year designation data from the above-mentioned input means 3 is decided. If the prescribed year is designated, the flow proceeds to step s6, and if the prescribed year is not designated, the flow waits at step s5. At step s6, the control means 2 prepares an estimate from the repair schedule plan, repair expense plan, and repair specification of the designated year. At step s7, a construction work specification corresponding to the repair content being applied to the designated year is prepared by the control means 2.

[0019] Then, the operation being implemented by the device 1 for preparing a repair plan is divided into four operations for

preparing repair specification, repair schedule plan, repair expense plan, estimate, and construction work specification and explained in detail. First, the operation for preparing the repair specification is explained. Figure 3 is a flow chart showing the operation for preparing the repair specification.

[0020] At step a1, a degradation diagnosis data is input. At step a2, an evaluation standard is read out of the memory means 4 to attain the degree of degradation based on the degradation diagnosis data input. At step a3, the degree of degradation based on the input degradation diagnosis data is attained using the read evaluation standard.

[0021] Also, prior to the input of the above-mentioned degradation diagnosis data, the degradation is diagnosed for each part for a structure being constituted by several parts.

[0022] Figure 4 is a plan view showing an example of a description paper 11 that is used when diagnosing the degradation and describes the outline of a building and the outline of an investigation. The description paper 11 includes a building code column 12 in which preset building codes are described for each building to identify the buildings, a building name column 13 in which the names of the building are described, a location column 14 in which the locations of the buildings are described, a construction work completion date

column 15 in which construction work completion dates of the buildings are described, a room number column 16 in which the number of room in a collective housing such as mansion is described, a structure column 17 in which the structure of the buildings is described in advance and a prescribed description is filled in the corresponding item, an investigation site column 18 in which all actually investigated part numbers among several parts given with numbers based on a design drawing are filled, an investigation and diagnosis item column 19 in which all actually investigated and diagnosed item numbers among several investigation and diagnosis items classified and given with numbers as will be mentioned later, and an investigation date column 20 in which an investigated date is filled.

[0023] In the above-mentioned investigation site column 18, for example, in case the building is a mansion, the numbers given to parts such as penthouse, rooftop, steel door, steel-frame step, and corridor handrail are filled. In the above-mentioned investigation and diagnosis item column 19, for example, the numbers given to investigation and diagnosis items such as external coating finishing material, body, steel coated film, rooftop waterproof, and sealing waterproof are filled.

[0024] Figure 5 is a plan view showing an example of the description paper 21 in which diagnosis results are filled.

Said description paper 21 includes a diagnosis item column 22 in which a description showing that the contents filled in the description paper 21 are the discoloration and decolorization of an external coating finishing material, a house number column 23 in which a housing number is described if there are several houses in a collective housing such as mansion, an investigated part column 24 in which only one actually investigated part number selected from the numbers filled in the above-mentioned investigation site column 18 is filled, an existing external coating finishing material column 25 I which the number is given to each kind of external coating finishing material and the existing external coating finishing material number that has already been spread is filled, part columns 26a-26d (generally called a part column 26) in which the parts shown by the numbers filled in the investigated part column 24 are further divided into fine parts such as east face, south face, west face, and north face and the investigated part numbers are filled one by one from several parts given with the numbers for each of said divided parts, and degradation degree columns 27a-27d (generally called a degradation degree column 27) in which the degree of degradation decided for each part filled in the part column 26 is filled.

[0025] Though the above-mentioned description paper 21 is a description paper for a discoloration and decolorization phenomenon as the decrease of the color of a coated film surface of an external coating finishing material, it is prepared for each of various degradation phenomena such as chalking phenomenon in which the coated film surface becomes a powder shape by ultraviolet rays, heat, wind and rain, etc., a stain phenomenon in which dust, iron rust, hand dirt, and oils and fats cannot be removed due to bacteria and mosses by a simple washing, and a wear phenomenon in which the coated film thickness is reduced by the progress of the above-mentioned chalking phenomenon.

[0026] For the discoloration and decolorization of the external coating finishing material, the degree of degradation filled in the above-mentioned degradation degree column 27 is attained as follows. First, a relatively dried surface with a uniform brightness is selected as an investigation site, and the color at a time of a new installation is estimated, referring to parts in which the degradation is not advanced. Next, the estimated color and the color of the investigation site surface are relatively compared, and the degree of discoloration and decolorization is attained as a G scale value by using a gray scale for discoloration and decolorization described in "JIS

L0804." The degree of degradation is attained from the G scale value and filled in the above-mentioned degradation degree /6 column 27. The following Table I is a table showing the correspondence of the degree of degradation and the G scale value.

[0027]

(Table I)

劣化ディグリ	Gスケール値	劣化状態
CD0	変退色なし	変退色なし
CD1	5	変退色がほとんどない
CD2	4.5	変退色がわずかに認められる
CD3	4	変退色が認められる
CD4	3.5	変退色がかなり認められる
CD5	3以下	変退色が顕著に認められる

1. Degree of degradation
2. G scale value
3. Degradation state
4. No discoloration and decolorization
5. Little discoloration and decolorization
6. Discoloration and decolorization are slightly recognized.
7. Discoloration and decolorization are recognized.
8. Discoloration and decolorization are considerably recognized.
9. Discoloration and decolorization are distinctly recognized.

[0028] The contents filled in the above-mentioned description papers 11 and 21 are optically read out by a readout means for realizing the input means 3, for instance, at step a1, and the processing of the steps a2 and a3 is carried out. However, in the discoloration and decolorization of the above-mentioned external coating finishing material, since the degree of degradation is easily attained when diagnosing the degradation, the degree of degradation can be directly filled in the description paper 21 when diagnosing. Therefore, in this case, the device 1 for preparing a repair plan does not need to carry out the processing of the steps a2 and a3 and may proceed to step a4 after the step a1. Also, in case the degree of degradation cannot be easily attained when diagnosing the degradation, a value corresponding to the G scale value for the diagnosis of discoloration and decolorization is filled.

[0029] For example, for the adhesion of the external coating finishing material, a numerical value being obtained as follows is filled. First, dusts, dirt, and oils and fats of an investigation site are removed, and a prescribe attachment is adhered with a binary epoxy adhesive and immediately fixed with an adhesion means such as gum tape. Next, a slit is inserted into the depth reaching an existing coated film by cutter knife,

etc., at the periphery of the above-mentioned attachment, and for example, a Takeshi ken type adhesion tester is mounted so that it may not collide with the attachment. Furthermore, the attachment is forcibly pulled out until it is peeled off, the peeled-off part is confirmed, and the pressure when peeling-off is read out. This value is filled in the column corresponding to the degradation degree column 27 of the above-mentioned description paper 21. The contents filled in the description paper 21 are read out at step a1, the correspondence relation of the above-mentioned pressure and the degree of degradation is read out at step a2, and the degree of degradation at the pressure obtained at step a3 is calculated.

[0030] Then, at step a4 of the above-mentioned flow chart, the degree of degradation is summarized and output to each description paper 21. Figure 6 is a plan view showing an example of the output of the degree of degradation summarized in each of the above-mentioned description paper 21. Four data filled in the above-mentioned part column 26 and the worst (highest) representative value of the degree of degradation are output as a bar graph 93. In the bar graph 93, a scale 92 showing the degree of degradation is given in the direction perpendicular to a preset reference line 91, and the degree of degradation of each degradation item is arranged at an equal

interval on the above-mentioned reference line 91. In this case, when the degree of degradation is 3 or more, it is decided that the degradation is recognized, and it is understood that the discoloration and decolorization of the external coating finishing material is advanced on the surfaces in all azimuths (east, south, west, and north). The bar graph 9 can be displayed on the display means 5 or can be printed and output from the printing output means 6.

[0031] Figure 7 is a plan view showing an output example of the case where an appearance is considered important as another output example of the above-mentioned degree of degradation. It relates to the external coating finishing material. The degree of degradation for each degradation item is summarized and displayed as a radar chart graph 96. In the radar chart graph 96, a scale 95 showing the degree of degradation is radially given from a preset base point 94, and the degree of degradation of each degradation item is arranged at an equal interval on the circumference around the above-mentioned base point 94. The degree of degradation connected by a line L1 is an actual investigation result, the degree of degradation connected by a line L2 is a limit value, and the degree of degradation connected by a line L3 is a safe value that does not need a repair. It is understood that a crack phenomenon as a partial

rupture phenomenon being generated by the strain in the coated film exceeds the limit value and there no problem at all in the adhesion. For example, in case the value exceeding L2 is two or more, it is decided that a repair is immediately required, and in case the value exceeding L3 is two or more, it is decided that a repair may be carried out, if necessary. In the other cases, it is decided that a repair may be carried out, while observing the future progress.

[0032] Figure 8 shows an example in which the degree of degradation is output as a radar chart graph 97 and is a plan view showing an output example of the case where a body protection performance is considered important. The degree of degradation connected by a line L4 is an actual investigation result, the degree of degradation connected by a line L5 is a limit value, and the degree of degradation connected by a line L6 is a safe value that does not need a repair. Similarly to the output example shown in Figure 7, though the crack phenomenon exceeds the limit value, the other items are in a range of the safe value or less connected by the line L6, and it is decided that no repair is required at present. The radar chart graphs 96 and 97 can also be output from the display means 5 or printing output means 6 similarly to the above-mentioned bar graph 93. Thus, different degradation items can be

relatively compared by attaining the degree of degradation and displaying it as a graph.

[0033] At step a5, an overall decision result table is output./7

Figure 9 is a plan view showing an example of an overall decision result table 101 being output from said step a5. The overall decision result table shows a building degradation state being estimated based on the relationship between the above-mentioned degradation items and the degree of degradation, and for example, the overall decision result table 101 shown in the figure has a part column 102 in which the result of a certain part is displayed, a building name column 103 in which the name of the building is displayed, a radar chart graph 104 similar to the above-mentioned one, a repair grade column 105 in which the grade of repair being selected based on the degree of degradation and proposed to a requester is displayed as a list, a material characteristic column 106 in which the characteristics of a material constituting the corresponding part are displayed, and an overall evaluation column 107 in which an overall estimated degradation state estimation result overall estimated from the degree of degradation of said corresponding part.

[0034] At step a6, the other overall decision results are output. Figure 10 is a plan view showing an example of the

overall decision result table 108 being output at said step a6. The contents of the above-mentioned overall decision result table being output for each part are summarized, the degradation state of the entire building is estimated from the degradation state of each part estimated, and it is hinted that the repair of a certain grade is desirable. For example, an item sheet for each item is output from the display means 5 or printing output means 6.

[0035] A person who requests a repair selects the grade of an actual repair, referring to the above-mentioned overall decision result tables 101 and 108. For this reason, for example, at steps a7-a11, several repair specification proposals are output. For example, several proposals are made for each of very high-quality specification, high-quality specification, and general specification. First, at step a7, an undercoat repair specification is output. The undercoat repair specification shows a method that recovers a body surface undercoat near a state at a time of a new construction. At step a8, an undercoat projection and adjustment specification is output. It shows a specification of an undercoat film corresponding to the grade of a paint being topcoated. At step 9a, a coating specification is output in accordance with the grade of the paint. At step a10,

a waterproof specification is output. At step a11, a sealing specification is output.

[0036] The specifications being output at the above-mentioned steps a7-a11 are stored for each grade in advance in the memory means 4. Figure 11 is a plan view showing a list 109 in which each specification being output at the steps a7-a11 is summarized. For example, as shown in the figure, the specifications of each grade are output. These specifications are output from the display means 5 or printing output means 6. A requester selects the grade of a desired repair from the above-mentioned list 109. Based on the grade of the selected repair, a written repair schedule plan and a written repair expense plan that will be mentioned later are prepared.

[0037] Figure 12 is a flow chart showing the operations for preparing the written repair schedule plan and the written repair expense plan. At step b1, a repair quantity data is input. Also, prior to the input of the repair quantity data, the quantity of the part, for example, area, length, and number are investigated.

[0038] Figure 13 is a plan view showing an example of a description paper 31 which is used in the investigation and filled with the quantity. The description paper 31 includes a building name column 32 in which the name of a building is

filled, a part column 33 in which the names of several parts are filled in advance, a unit column 34 in which the unit showing the quantity of the above-mentioned part is filled in advance, a quantity column 35 in which the quantity of each part is filled by the investigation, and a blank column 36 for calculation being used in the calculation for attaining the quantity. The quantity filled in the description paper 31 is optically read out by a readout means for realizing the input means 3, for instance.

[0039] At step b2, the quantity being input is totaled for each kind of part. For example, there are several houses, the quantity investigated for each house is totaled for each kind of the same part.

[0040] At step b3, the repair specification corresponding to the grade of the repair selected by the requester is read out.

[0041] At step b4, a written repair schedule plan is prepared for a preset period, for example, 20 years. It shows a repair schedule plan being applied for each service life for the above-mentioned 20 years based on the service life corresponding to the grade of the repair selected by the requester, and the written repair schedule plan including the repair quantity and the repair specification is prepared.

[0042] At step b5, a written repair expense plan for the above-mentioned 20 years is prepared. In this preparation, a yearly repair quantity B being applied each year is attained based on the repair schedule plan prepared for the above-mentioned step b4, and assuming a preset repair unit price as C, a repair expense $A = B \cdot C$ required for each year is attained.

Furthermore, a predicted repair expense Y in which a price rise rate α being predicted each year is added to said repair expense A, and a predicted repair expense Y for each year is totaled, so that a total predicted repair expense X for 20 years is calculated.

[0043] For example, the price rise rate α is added as follows. Assuming the repair unit price at the initial year, that is, the preparation year of the written repair expense plan as C_1 and the repair unit price at the next year as $C_2 = C_1 \cdot (1 + \alpha)$, the repair unit prices being predicted for 20 years from the next year are respectively attained, and the repair expense for each year is attained using the repair price unit in each year. The repair expense of the first year attained is the above-mentioned repair expense A, and the total of the repair expense of each year attained is the above-mentioned total predicted repair expense X.

[0044] Also, when the first digit of the repair expense attained is 2 yen or less, it is cut off, and when it is 8 yen or more, it is raised. In the other cases, it is processed as 5 yen. Also, the price rise rate α being added in attaining the repair unit price at the above-mentioned next year and the price rise rate α being added in attaining the repair unit price at the year after the next year may be the same value or may also be different values. The price rise rate is also similar for other years. /8

[0045] Figure 14 is a plan vie showing an example of a repair item list 41. With the processing of the above-mentioned step b5, the repair item list 41 includes a building name column 42 in which the name of a building is displayed, a part column in which the names of several parts are displayed, a specification column 44 in which the specification of the above-mentioned part is displayed, a precious repair year column 45 in which a previous repair year is played, a repair period column 46 in which the period of the repair is displayed, a unit layer 47 in which a unit showing the quantity of each part is displayed, a quantity column 48 in which the quantity of each part is displayed, a unit column 49 in which a repair unit price is displayed, and an amount column 50 in which the amount of repair money for each part is displayed.

[0046] Figure 15 is a plan view showing an example of a written repair schedule plan and written repair expense plan 51. The written repair schedule plan and written repair expense plan 51 shows repair years, the repair expense of each year, and the total of the repair expenses and has year column 52, repair expense column 53, and repair expense total column 54. Also, the repair expenses and the total amount of repair expenses are shown by bar graphs. An area 55 shown by a black coat in an area 56 shows a repair expense required for the corresponding year. Therefore, no repair is carried out for the year in which the area 55 with a black coat is not displayed. Also, the corresponding repair expense 53 is a blank. At the first year (here, 1994), the repair expense and the total expense required for the year are not equal. With this written plan 51, the repair schedule plan and a rough expense plan can be easily recognized at a glance by the written plan 51. The written plan 51 can be output from the display means 5 or printing output means 6.

[0047] At step b6, the amount of money laid aside is calculated based on the above-mentioned predicted repair expense Y. For example, in a mansion, assuming the share ratio of each room as D, a predicted repair expense $Z = Y \cdot D$ per one year and one room is calculated. Also, the above-mentioned share ratio D is

attained by $D = D2/D1$, assuming that the total value of the occupied area of the total rooms as $D1$ and the occupied area of one room as $D2$. The amount of money per one month is calculated by dividing the predicted repair expense Z by the number of month of one year, that is, 12.

[0048] At step b7, an income and expenditure simulation is carried out based on the prepared written plan. This simulation is carried out using the income due to the current repair lay-aside amount of money, the lay-aside amount of money (actually, the lay-aside amount of money or the amount of money required by the prepared written plan), and a collected or borrowed temporary amount when the repair lay-aside amount of money is insufficient and the expenditure due to the repair expense for a repair being applied each year and the repayment based on a temporary amount and its interest. For example, in case the repair expense exceeding the lay-aside balance is required, the shortage amount of money is temporarily collected, or part of the shortage amount is temporarily collected and the rest is borrowed, or the total amount is borrowed. If the money is borrowed, the repayment of the borrowed money is included in the expenditure amount of the next year.

[0049] At step b8, a written expenditure plan based on the current situation is output. Figure 16 is a plan view showing

an example of a written income and expenditure plan 61 based on the current situation. The written income and expenditure plan 61 has year column 52, repair expense column 53, and repair expense total column 54 similar to those of the above-mentioned written repair schedule plan and written repair expense plan 51 and further has a lay-aside amount balance column 62, and the details of the amount of money required each year are shown by bar graphs as will be mentioned later. 63 in the bar graphs shows an [illegible] lay-aside amount of money, an area 64 shows a repair expense total amount of money, an area 65 shows a repayment interest amount of money, an area 66 shows a repair expense of each year, an area 67 shows a lay-aside amount of money, an area 68 shows a loan repayment amount of money, an area 69 shows a temporary collected amount of money, and 70 is a total amount of money such as lay-aside amount, temporary collected amount, and repair expense payment. At present (the amount laid aside is 3,100 yen), it is understood that the lay-aside balance in the red after 13 years, that is, after the year 2007.

[0050] At step b9, a written revised income and expenditure plan is output. Figure 17 is a plan view showing an example of a written revised income and expenditure plan 71 is constituted similarly to the above-mentioned written income and expenditure

plan 61. The example shown in the figure is a proposal of 5,450 yen as a lay-aside amount of money. According to this proposal, it is understood that the lay-aside balance is in the black after 19 years, that is, after the year 2013. Also, as other proposal, a proposal that slowly increases the lay-aside amount of money can also be output. The written repair schedule plan, the written repair expense plan, and the written income and expenditure plan prepared in this manner are stored in the RAM.

[0051] Figure 18 is a flow chart showing an operation for preparing an estimate. At step c1, a prescribed year is designated from the input means 3. At step c2, quantity, specification, and expense for a repair being applied at the designated year are read out of the written plan stored in the memory means 4 when the above-mentioned written repair schedule plan and written repair expense plan are prepared. At steps c3 and c4, estimates including the quantity, specification, and expense of the repair being applied at the designated year at the above-mentioned step c1 are prepared. In this case, at step c3, the following estimate 75 is prepared, and at step c4, an estimate 81 is prepared.

[0052] Figure 19 is a plan view showing an example of the estimate 75. The estimate 75 has a construction work name column 76 in which the name of a construction work is displayed,

a name column 77 in which construction work parts are displayed, a specification column 78 in which the specification corresponding to each part is displayed, a unit column 79 in which a unit showing the quantity of the parts is displayed, and a quantity column 80 in which the quantity of the parts is displayed.

[0053] Figure 20 is a plan view showing an example of the estimate 81. The estimate 81 has construction work name column 76, name column 77, specification column 78, unit column 79, and quantity column 80 similar to those of the above-mentioned estimate 75 and also has a unit column 82 in which the unit price required for the construction work of each part is filled and an amount column 83 in which the amount of money is filled. The estimate 81 is used in bidding a construction work, and a party concerned who desires the application of the construction work fills each amount of money in the above-mentioned unit column 82 and amount column 83.

[0054] At step c5, an expense comparison table in the specification of each grade proposed when preparing the specification is output. At step c6, a construction work budget (assessment) amount of money is output. At step c7, the amount of money filled in the above-mentioned estimate 81 is input by bidders. This input is input from an optical readout means, for

instance, similarly to the above-mentioned degradation diagnosis data and repair quantity data. At step c8, the comparison table of the bidders is output.

[0055] Figure 21 is a flow chart showing an operation for preparing a construction work specification. At step d1, a prescribed year is designated from the input means 3. at step d2, several construction work specifications that are given with specification codes and stored in advance in the memory means 4 are read out. The construction work specification shows detailed contents such as materials, makers, product names, spreading sequences, spreading methods, and conditions. At step d3, the outline of a construction work such as place, name of a requester, construction work completion date, and construction period are input. At step d4, a repair specification for a repair being applied at a designated year is read out of the written plan stored in the memory means 4 when the above-mentioned written repair schedule plan and written repair expense plan are prepared. At step d5, a construction specification for the repair being applied at the designated year is prepared based on the read repair specification. For example, construction work specifications 85-88 in which the following construction work sequence is divided into several processes are prepared.

[0056] Figure 22 is a plan view showing the construction work specification 85. In the construction work specification 85, an undercoat repair work is divided into several processes e1-e10 and shown as a flow chart. In the block showing each process, the name of a construction work briefly showing a construction work content being applied is described. Also, the specification of the construction work is described by a specification code. For example, in the process e3 described as "crack floating treatment, etc.," a construction work being stored in the specification code "30-60" is applied.

[0057] Figure 23 is a plan view showing a construction work specification 86. In the construction work specification 86, a crack standard treatment method as the process et of the above-mentioned construction work specification 85 is divided into several processes f1-f12 and shown as a flow chart. In the block showing each process, the name of a construction work briefly showing a construction work content being applied is described similarly to the above-mentioned construction work specification 85. Also, the corresponding specification code is described in the construction work specification 86.

[0058] Figure 24 is a plan view showing a construction work specification 87. The construction work specification 87 includes figures showing construction work methods being carried

out by a flow of processes f2-f5, f10, and f11 of the above-mentioned construction work specification 86, a flow of processes f6-f8, f10, and f11, and a flow of processes f9 and f11. For example, a construction work being carried out at a time of "crack of 1 mm or more," that is, injection of an epoxy resin (process f3), U cut treatment (process f4), primer spread (process f5), chalking (process f10), and filler treatment (process f11) are shown stepwise in the figure.

[0059] Figure 25 is a plan view showing a construction work specification 88. The construction work specification 88 includes a list in which an undercoat reinforcement projection and adjustment construction work into three processes, that is, divided into three processes of material adjustment, undercoat reinforcement, and undercoat projection and adjustment and construction work conditions in each process are shown. In said list, paint name, coating times, standard amount of spread, drying time when recoating, diluent, dilution rate, and coating method, etc., being used in each process are described. Also, construction work name, construction work specification, specification code, etc., are described in the construction work specification 88.

[0060] As mentioned above, according to this application example, the necessity of a certain repair at a certain time is

understood, and the expense for the purpose is clarified. Also, a repair expense for one room required for one year is clarified. Furthermore, whether or not the current lay-aside amount of money is appropriate can be decided by the written income and expenditure plans 61 and 71. Therefore, the best lay-aside amount of money for the repair being repeated can be easily set, and when the current lay-aside amount of money is insufficient and the lay-aside amount of money is increased, a logic explanation for making a user understand can be done. This explanation is carried out utilizing the output result from the display means 5 or printing output means 6.

[0061] Also, in cases other than the collective housing such as mansion, since the repair expense required for one year is distinct, a requester can easily make an expense plan for repairs.

[0062]

(Effects of the invention)

As mentioned above, according to the present invention, with the schedule plan and the expense plan of repairs over a long term, the necessity of a certain repair at a certain time is understood, and the expense for the purpose is also clarified. In the expense plan, the price rise rate α is added, and the reliability is high. Therefore, a person who requests

the repair can easily make an expense plan for the purpose, and a required expense can be reliably prepared. Also, an estimate can be used in construction work bid, etc. Furthermore, the construction work contents can be specifically detected by the construction work specification.

[0063] Also, the expense plan can be specifically detected by the income and expenditure. For example, since it is understood that the amount being laid aside yearly or monthly, for instance, is understood, the repair being repeated over a long term can be prevented from being in the red, or a temporary shortage amount of money can be prevented from being collected. Also, this data is effectively utilized when the lay-aside amount is increased.

[0064] Also, when the structure is a collective housing, the repair expense per one user required for one year is clarified. Therefore, the expense plan for each user can be made.

[0065] Also, since the relationship between the degradation /10 items and the degree of degradation is output as a bar graph or a radar chart graph, the degradation state of the structure can be easily confirmed with the naked eyes. With the output as a graph, several degradation items for each part can be easily relatively compared.

[0066] Also, since the expense plan is output as a bar graph, the plan for the repair of the structure over a long term can be easily detected with the naked eyes.

[0067] Also, since the construction work sequence of the construction work specification is divided into several processes and output as a flow chart including figures showing construction methods or a table showing construction work conditions, the construction work specification can be easily detected with the naked eyes.

4. Brief description of the figures

Figure 1 is a flow chart briefly showing the operation of a device 1 for preparing a repair plan of an application example of the present invention.

Figure 2 is a block diagram showing the constitution of the device 1 for preparing a repair plan.

Figure 3 is a flow chart showing the operation for preparing a repair specification.

Figure 4 is a plan view showing an example of a description paper 11.

Figure 5 is a plan view showing an example of a description paper 21.

Figure 6 is a plan view showing an example of the output of the degree of degradation summarized in each of the above-mentioned description paper 21.

Figure 7 is a plan view showing an output example of the case where an appearance is considered important as another output example of the above-mentioned degree of degradation.

Figure 8 is a plan view showing an output example of the case where a body protection performance is considered important as another output example of the above-mentioned degree of degradation.

Figure 9 is a plan view showing an example of an overall decision result table 101.

Figure 10 is a plan view showing an example of an overall decision result table 108.

Figure 11 is a plan view showing a list 109 in which each specification is summarized.

Figure 12 is a flow chart showing the operations for preparing a written repair schedule plan and a written repair expense plan.

Figure 13 is a plan view showing an example of a description paper 31.

Figure 14 is a plan view showing an example of a repair item list 41.

Figure 15 is a plan view showing an example of a written repair schedule plan and written repair expense plan 51.

Figure 16 is a plan view showing an example of a written income and expenditure plan 61.

Figure 17 is a plan view showing an example of a written revised income and expenditure plan 71.

Figure 18 is a flow chart showing an operation for preparing an estimate.

Figure 19 is a plan view showing an example of the estimate 75.

Figure 20 is a plan view showing an example of the estimate 81.

Figure 21 is a flow chart showing an operation for preparing a construction work specification.

Figure 22 is a plan view showing a construction work specification 85.

Figure 23 is a plan view showing a construction work specification 86.

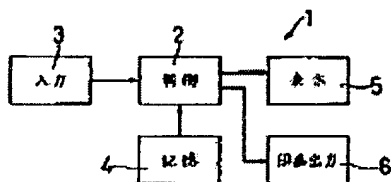
Figure 24 is a plan view showing a construction work specification 87.

Figure 25 is a plan view showing a construction work specification 88.

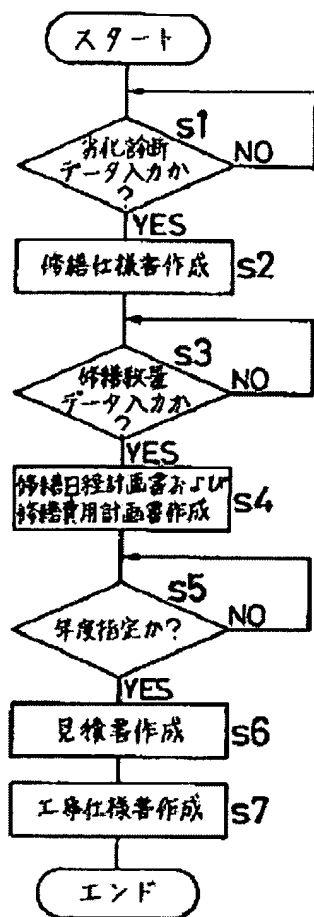
Explanation of numerals:

- 1 Device for preparing a repair plan
- 2 Control means
- 3 Input means
- 4 Memory means
- 5 Display means
- 6 Printing output means
- 11, 21, 31 Description papers
- 51 Written repair schedule plan and written repair expense
plan
- 61, 71 Written income and expenditure plans
- 75, 81 Estimates
- 85-88 Construction work specifications
- 93 Bar graph
- 96, 97 Radar chart graphs
- 101, 108 Overall decision result tables

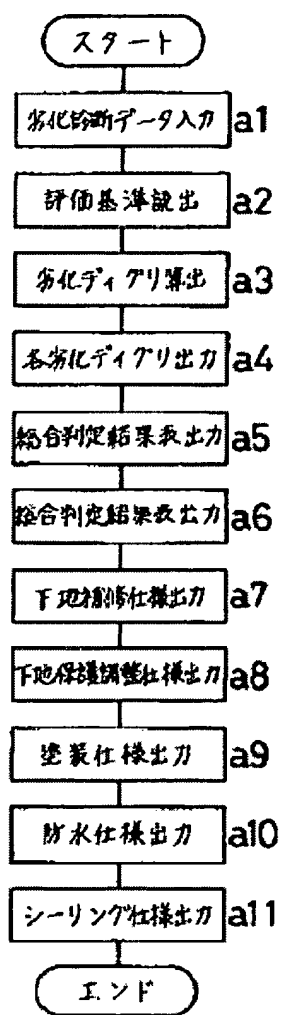
【图2】



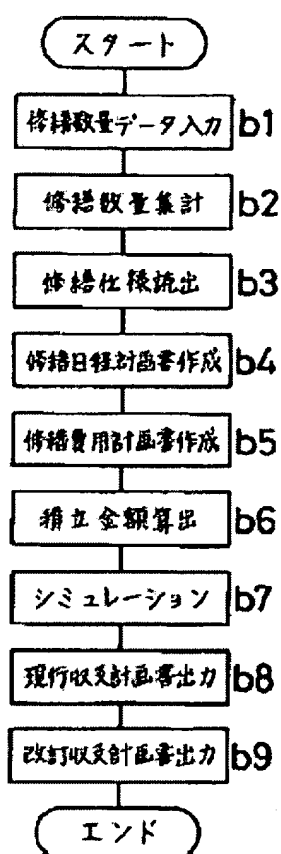
【図1】



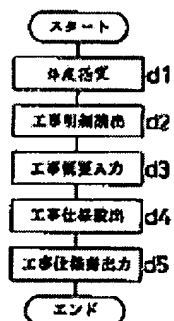
【図3】



【図12】



【図21】



【図4】

12
13
11

建物 3-1	-	建物 名称	○○XX	
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14 建物概要及び調査概要

所在地 ○○○X

竣工 19 78 年 10 月 17 戸数 16 戸

BRC	✓	RC		PC		8		CB		W
地上	11	階	地下		階	塔屋		階		
砂		戸	砂		戸	砂	1	戸	砂	1
		戸			戸		1	戸		1

調査箇所 1 31 22 21 23

調査箇所項目 1 2 3 42 43

調査日 19 93 年 10 月 23 日 ~ 19 年 月 日

既存外周擁壁土留の調査	部位	1	2	4	5		
土留		1	3	1	101		

調査先 ☒ 管理組合 ☐ その他

調査日 19 93 年 11 月 日

作成 コード 11 名称

調査者	コード	11	氏名		
	コード	1	氏名	コード	2 氏名
	コード		氏名		
	コード		氏名	コード	氏名

調査判定	コード	1	氏名		
採掘者	コード	1	氏名	登録番号	-

【図5】

通称コード
-
-
品物名称
〇 〇 × ×

22 外装被仕上げ材の劣化診断
(黄変色の劣化診断)

診断項目 1 黄褐色

検査号 23

調査部位 1 既存外装被仕上げ材 1 25

24

順 位	劣化レベル	比較用レベル	値	考
26a	1	CD	4	27a
	2	CD	4	
⋮	3	CD	4	⋮
26d	4	CD	4	27d

検査号

調査部位 既存外装被仕上げ材

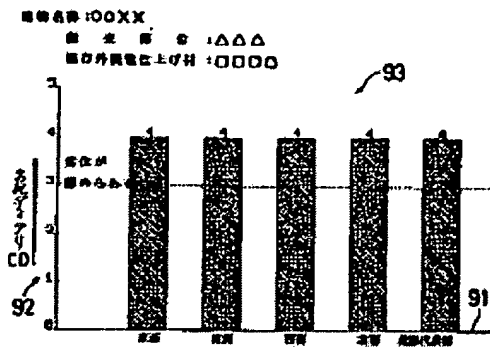
順 位	劣化レベル	比較用レベル	値	考
	CD			
	CD			
	CD			
	CD			

検査号

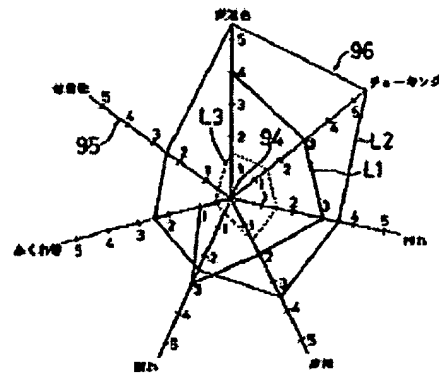
調査部位 既存外装被仕上げ材

順 位	劣化レベル	比較用レベル	値	考
	CD			
	CD			
	CD			
	CD			

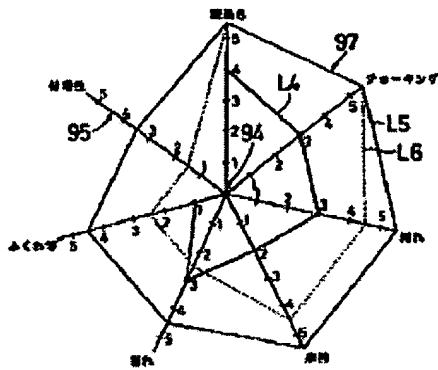
【図6】



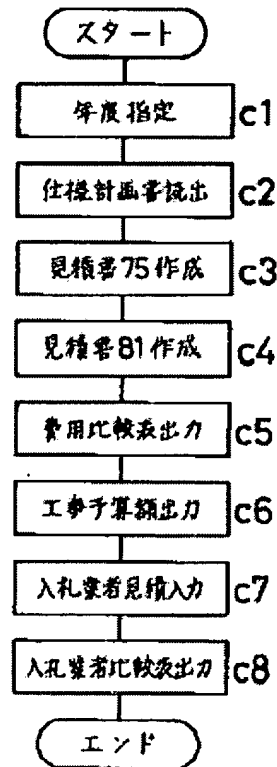
【図7】



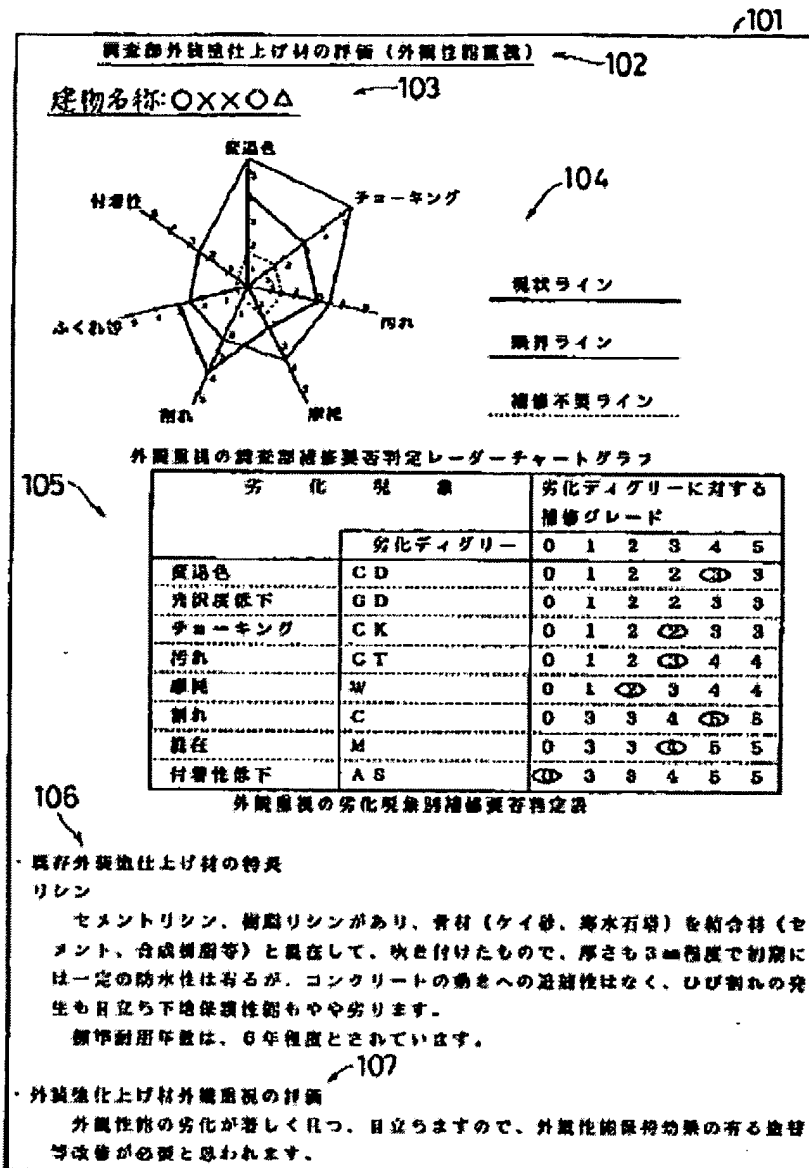
【図8】



【図18】



【図9】



建物全体の調査結果表

建物名称: ○××○△

調査部と建物全体を比較評価すると、劣化の程度はほぼ同等に見受けられますので、前述の調査部の劣化診断結果がそのまま、あてはまると想定されます。

1. 劣化診断についての総合所見

・外装塗り仕上げ材

外観性能の劣化が著しく目立つ、目立ちますので、外観性能保持効果のある塗料等改修が必要と思われます。

下地保護機能の低下が認められ、今後その範囲が拡大する可能性が有りますので、補修は必要と思われます。

・躯体

中性化の進行はあまりなく、現時点での中性化による鉄筋腐食は考えられませんので、補修は必要ないと思われます。

コンクリート強度は、躯体強度測定値が、設計基準強度以上有り、測定精度にバラツキがあるもののほぼ、問題はないと思われます。

表面劣化がある程度の範囲に認められますので、耐久性を考慮した補修が必要と思われます。

・鉄筋腐蝕

外観性能の劣化が著しく認められ、目立ちますので、外観性能保持効果のある塗料等改修が必要と思われます。

錆びの発生があり、今後断面欠損も生じる可能性がありますので、早急に防錆性を考慮した補修が必要です。

・防水

屋上防水は、現状放置可能であるが、今後も点検は必要と思われます。

シーリング防水は、漏水事故に直接結びつく劣化現象が見受けられ、耐用年数に達していますので早急な補修が必要と思われます。

1. 改修仕様設計概要案

グレード 項目	超 高 級	高 級	一 般
下地補修	全面打掃を行い、下地補修を行う		
高圧水洗	水圧75～120kg/cm ² で行う		
塗 装	下地補修、水洗後、以下の仕様の作業を行う		
外壁（雨側）	弾塑性保護鋼板材＋ 二液弾性7999シリコン樹脂	弾塑性保護鋼板材＋ 二液弾性ウレタン樹脂	弾塑性保護鋼板材＋ 二液ウレタン樹脂
外壁（非雨側）	弾塑性保護鋼板材＋ 二液弾性7999シリコン樹脂	弾塑性保護鋼板材＋ 二液弾性ウレタン樹脂	弾塑性保護鋼板材＋ 水性トップコート
天 井	砂壁状塗料		
鉄 幕	遮断シアナミ＋鉄幕用塗料2回		
一 般 装 飾	エポキシ系サビドメ＋ シリコンアルキッド	エポキシ系サビドメ＋ マリンペイント2回	エポキシ系サビドメ＋ マリンペイント2回
ベランダ防水	ポリマーセメント系防水材		
屋上防水	現状設置可能であるが、今後点検は必要と思われます。		
シーリング防水	漏水事故に直接結びつく劣化現象が見受けられ、耐用年数に達しているため早急な補修が必要と思われます。		

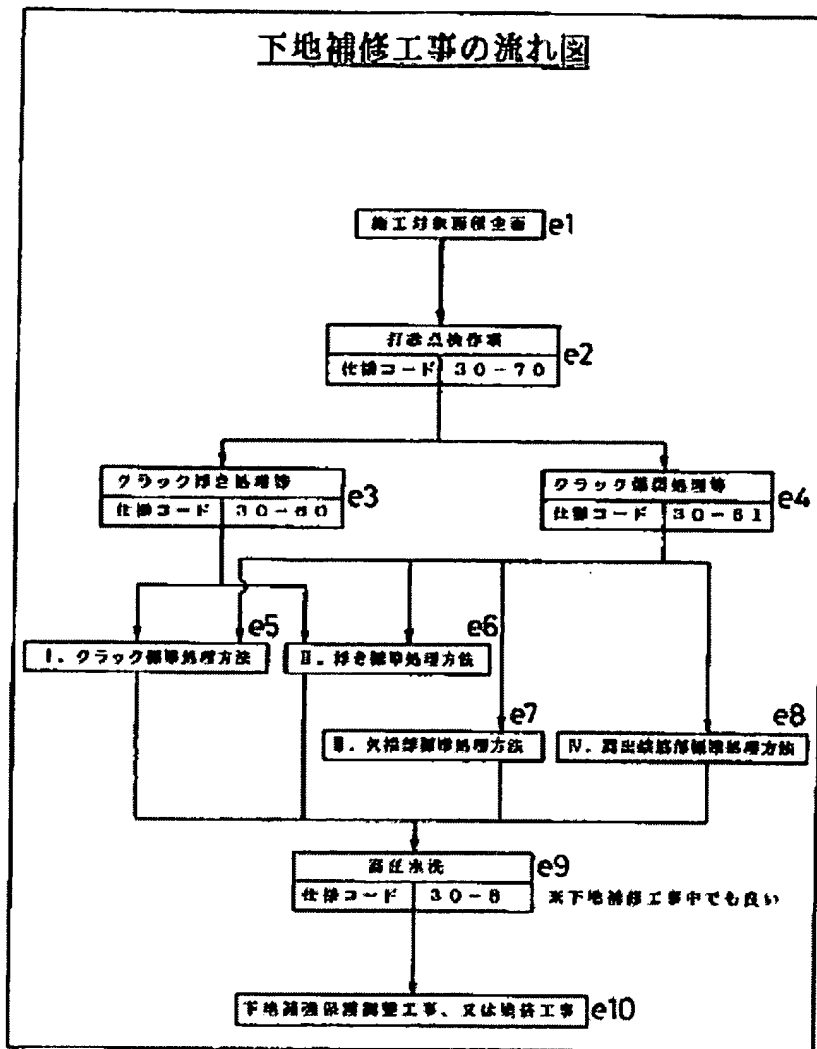
77 工事名称 76 78 79 80 82 83 2

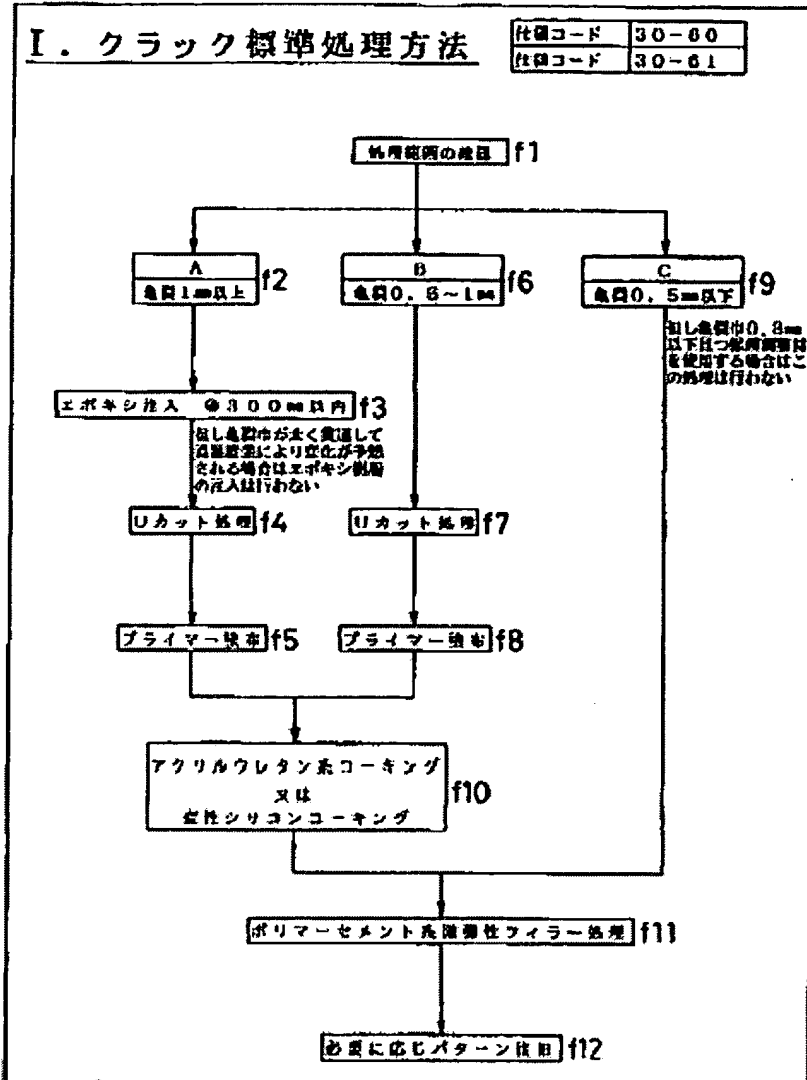
77	76	78	79	80	82	83	2
工事名称	工事内容	工事場所	工事数量	単価	工事費	工事費	工事費
2 道路改良工事							
所費							
延長外延工事費(1-1)	延長外延工事費			631.02			
	工事仕様書 D.延長工事 (1)延長工事 工事						
マンホールド工事							
マンホールド外延工事費(2-1)	マンホールド外延工事費			1,031.86			
	工事仕様書 D.延長工事 (1)延長工事 工事						
路上バレット工事							
バレット外延工事費(3-1)	バレット外延工事費			3,431.12			
	工事仕様書 D.延長工事 (1)延長工事 工事						

(B1201)

【図22】

85

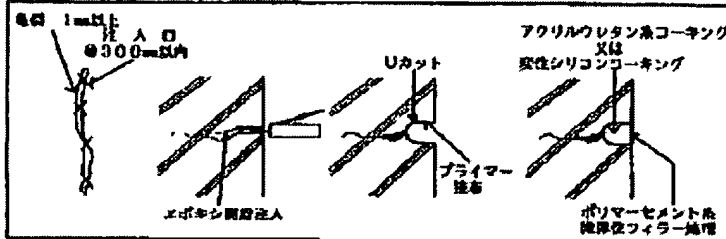




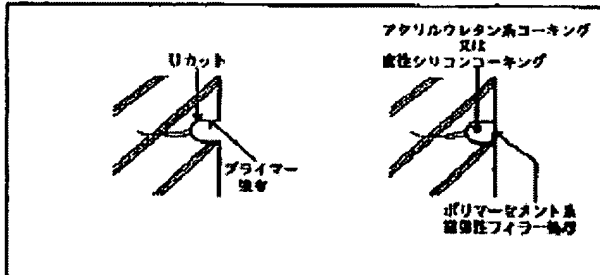
I. クラック標準処理方法

仕組コード	30-80
仕様コード	30-81

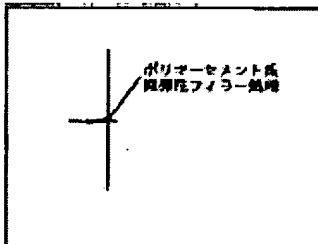
A. 亀裂1mm以上



B. 亀裂0.5mm～1mm



C. 亀裂0.5mm以下



*エポキシ樹脂等指定品

- ・SSSボンド#1000
- ・ボンドE2UG
- ・アサヒボンド371

*コーキング材等指定品

- ・ボンドAUシール (プライマー#7)
- ・反応性シリコンコーク (プライマー#9)
- ・ハマタイトスーパー1 (プライマーNO40)
- ・ペンギンクール2550HM (プライマーHM-3)

*ポリマーセメント・繊維強化ファイラー等指定品

- ・アレスゴムファイラーM
- ・ダンファイラー

下地補強保護調整工事						
工事名称 : 〇〇XX		外壁その仕修工事		仕様コード : 40-32-①		
工事仕様 : 高弾性保護塗料+アクリルシリコン樹脂 ① 下地補強保護調整工事 特殊合板補強シーラー+高弾性保護塗料 コンクリート特殊合板補強シーラー 1 月塩+ポリマーセメント系高弾性保護塗料 2 月塩						
工段	塗料名	厚さ (mm)	塗り回数 (回)	塗り時間 (分)	備考 (%)	塗布方法
1	高弾性保護塗料 (下地補強工事 (30-7, 30-8)) の項目に依る 汚損・埃・汚れを除去 (高圧水洗) した後、必要に応じパターン付 を行う。					
2	コンクリート特殊合板補強 シーラー	1	0.08 0.09	3時間以上		刷毛 及び 中巻ウール ローラー
3	ポリマーセメント系高弾性 保護塗料	2	1.8 2.2	16時間 7日		多孔質 ローラー

☐ 仕様範囲
 工事仕様 高弾性保護塗料+アクリルシリコン樹脂 ① 下地補強保護調整工事 特殊合板補強シーラー+高弾性保護塗料の示す仕様範囲は、上層2、下地補強から下層2、下地保護調整までとする
 なお上層1、下地補強は下地補強工事仕様 エアブロー処理 (30-7)、高圧水洗 水圧100-150kg/cm² (30-8)を示す

☐ 仕様等指定品
 <下地補強材>
 A社 リーコンCWS
 B社 ミラクルLI

<下地保護調整材>
 C社 シントーセメン#200
 B社 フレスポラック

☐ 施工部位 () 内は部位コードを示す
 壁面・・・壁面パラペット天端部(1-15)
 屋上パラペット開口部・・・パラペット側面(3-4)、パラペット天端部(3-10)、併設部(ハット小)部
 部(3-67)、ルーフバルコニーパラペット部(3-303)、ルーフバルコニー立上ハット部(3-304)
 外構付風雨壁・・・ゴミ置場パラペット部(10-201)

Figure 2:

- 2 Control
- 3 Input
- 4 Memory
- 5 Display

6 Printing output

Figure 1:

1. Start
2. End
- s1 Degradation diagnosis data input?
- s2 Repair specification preparation
- s3 Repair quantity data input?
- s4 Preparation of a written repair schedule plan and a written repair expense plan
- s5 Year designation?
- s6 Estimation preparation
- s7 Construction work specification preparation

Figure 3:

1. Start
2. End
- a1 Degradation diagnosis data input
- a2 Evaluation standard readout
- a3 Degradation degree calculation
- a4 Each degradation degree output
- a5 Overall decision result table output
- a6 Overall decision result table output

- a7 Undercoat repair specification output
- a8 Undercoat projection and adjustment specification output
- a9 Coating specification output
- a10 Waterproof specification output
- a11 Sealing specification output

Figure 12:

- 1. Start
- 2. End
- b1 Repair quantity data input
- b2 Repair quantity totaling
- b3 Repair specification readout
- b4 Written repair schedule plan preparation
- b5 Written repair expense plan preparation
- b6 Lay-aside amount calculation
- b7 Simulation
- b8 Written current income and expenditure plan output
- b9 Written revised income and expenditure plan output

Figure 21:

- 1. Start
- 2. End
- d1 Year designation

- d2 Construction work specification readout
- d3 Construction work output input
- d4 Construction work specification readout
- d5 Construction work specification output

Figure 4:

1. Building code
2. Building name
3. Building outline and investigation outline
4. Location
5. Construction work completion
6. Structure
7. Ground
8. Story
9. Underground
10. Penthouse
11. Electricity room
12. Room
13. Number of room
14. October 1978
15. Investigation site
16. Investigation diagnosis item
17. Investigation date

18. October 23, 1993
19. Outline of existing external coating finishing material
20. Part
21. Finishing material
22. 19 () year () month () day
23. Submission destination
24. Management combination
25. Others
26. Submission date
27. November, 1993
28. Preparation
29. Code
30. Title
31. Investigator
32. Code
33. Title
34. Name
35. Evaluation decision technician
36. Registration No.

Figure 5:

1. Building code
2. Building name

3. Degradation diagnosis of external finishing agent
(Degradation diagnosis of discoloration and decolorization)
4. Diagnosis item
5. Discoloration and decolorization
6. Bar No.
7. Investigation reparation
8. Existing external coating finishing material
9. Part
10. Degree of degradation
11. Please [illegible].
12. Remarks
13. Existing external coating finishing material

Figure 6:

1. Building name
2. Investigation part
3. Existing external coating finishing material
4. Degradation degree CD
5. Degradation is recognized.
6. East face
7. South face
8. West face
9. North face

10. Optimum representative value

Figure 7:

1. Discoloration and decolorization
2. Attachment
3. Swelling, etc.
4. Cracks
5. Wear
6. Stain
7. Chalking

Figure 8:

1. Discoloration and decolorization
2. Attachment
3. Swelling, etc.
4. Cracks
5. Wear
6. Stain
7. Chalking

Figure 18:

1. Start
2. End

- c1 Year designation
- c2 Written specification plan readout
- c3 Estimate 75 preparation
- c4 Estimate 81 preparation
- c5 Expense comparison table output
- c6 Construction work budget amount output
- c7 Bidder estimation input
- c8 Bidder comparison table output

Figure 9:

1. Evaluation of external coating finishing material of investigation parts (the appearance performance is considered important)
2. Building name
3. Discoloration and decolorization
4. Attachment
5. Swelling, etc.
6. Cracks
7. Wear
8. Stain
9. Chalking
10. Current line
11. Limit line

12. Unnecessary repair line
13. Investigation part repair necessity decision radar chart graph in which the appearance is considered important
14. Degradation phenomenon
15. Repair grade to the degree of degradation
16. Degree of degradation
17. Discoloration and decolorization
18. Glossiness decrease
19. Chalking
20. Stain
21. Wear
22. Cracks
23. Mixture
24. Attachment decrease
25. Degradation phenomenon repair necessity decision table in which the appearance is considered important
26. Merits of existing external coating finishing materials:
Lysine

There are cement lysine and resin lysine, and an aggregate (silica, cold water stone tower) is mixed with a binder (cement, synthetic resin, etc.) and sprayed, the thickness is also about 3 mm, and a fixed waterproofness is initially shown. However, there is no followability to the movement

of a concrete, the generation of fissure cracks are distinct, and the undercoat protection performance is slightly inferior.

It is said that the standard service life is about 6 years.

Evaluation of external coating finishing material appearance:

Since the degradation of the appearance performance is considerable and distinct, it is considered that the improvement of coating, etc., having an appearance performance retention effect.

Figure 10:

Investigation result table of the entire building

Building name: OXXOA

When the investigation parts and the entire building are compared and evaluated, since the degree of degradation is almost equivalently seen, it is assumed that the degradation diagnosis results of the above-mentioned investigation parts are fitted as they are.

1. Overall opinions about degradation diagnosis

- External coating finishing material

Since the degradation of the appearance performance is considerable and distinct, it is considered that the improvement

of coating, etc., having an appearance performance retention effect.

- Body

Since there is no considerable progress of the neutralization and the steel bar corrosion due to the neutralization is not considered at present, it is considered that no repair is required.

In the concrete strength, although the measured body strength value has a design reference strength or more and scattering exists in the measurement precision, it is considered that there is no problem.

Since the surface degradation is recognized to a certain degree, it is considered that a repair in which the durability is considered is required.

- Iron part coated film

The degradation of the appearance performance is considerably recognized and distinct, it is considered that the improvement of coating, etc., having an appearance performance retention effect.

Since there is the generation of rust and there is a possibility that a sectional loss will also be caused in the future, a repair in which the corrosion prevention is considered immediately required.

- Waterproof

A roof waterproof can be currently held, however it is considered that the check will also be required in the figure.

Since a degradation phenomenon in which the sealing waterproof is directly connected to a water leak accident is seen and the service life is expired, it is considered that an urgent repair is required.

Figure 11:

1. Revised repair specification design outline proposal
2. Grade
3. Item
4. Very high quality
5. High quality
6. General
7. Undercoat repair
8. The entire surface is diagnosed, and the undercoat is repaired.
9. High-pressure water washing
10. Water pressure of 75-120 kg/m²
11. Coating
12. After undercoat repair and water-washing, the work is carried out according to the following specification

13. Outer wall (straddling)
14. Fine elastic protective adjusting material + two-liquid
elastic acryl silicon resin
15. Fine elastic protective adjusting material + two-liquid
elastic urethane resin
16. Fine elastic protective adjusting material + two-liquid
urethane resin
17. Outer wall (non-straddling)
18. Fine elastic protective adjusting material + two-liquid
elastic acryl silicon resin
19. Fine elastic protective adjusting material + two-liquid
elastic urethane resin
20. Fine elastic protective adjusting material + aqueous
topcoat
21. Ceiling
22. Sand wall-shaped paint
23. Iron part
24. Fast-drying cyanami + paint for iron door, twice
25. General iron part
26. Epoxy group antirust + silicon alkyd
27. Epoxy group antirust + marine paint, twice
28. Epoxy group antirust + marine paint, twice
29. Veranda waterproof

30. Polymer cement group waterproof material
31. Roof waterproof
32. Though it can be currently held, it is considered that the check will be required in the future.
33. Sealing waterproof
34. Since a degradation phenomenon in which the sealing waterproof is directly connected to a water leak accident is seen and the service life is expired, it is considered that an urgent repair is required.

Figure 13:

1. 1 tower door
2. Mansion name OOX
3. Type
4. Part
5. Number of room
6. Unit
7. Quantity
8. Calculation equation
9. House
10. Penthouse outer wall [illegible]
Penthouse [illegible]
Penthouse [illegible]

Penthouse [illegible]
Penthouse [illegible]
Penthouse [illegible]
Penthouse [illegible]
Penthouse [illegible]
Penthouse [illegible]
Elevating [illegible] concrete waterproof
11. 1/2 steel [illegible]
[illegible]
Steel door [illegible]
[illegible] pipe [illegible]
[illegible]
[illegible]
Penthouse louver steel bar [illegible]
Aluminum bar clear [illegible]
[illegible] chalking [illegible]
Opening chalking three-way [illegible]

Figure 14:

1. Preparation date
2. Building name
3. Part
4. Penthouse

5. Penthouse outer wall [illegible]
6. Penthouse outer wall [illegible]
7. Penthouse outer wall [illegible]
8. Penthouse outer wall, etc., high-pressure water washing
9. Penthouse outer wall [illegible]
10. Penthouse [illegible]
11. Penthouse [illegible]
12. Specification
13. Repair item list
14. Repair plan proposer
15. Repair plan preparer
16. Previous
17. Period
18. Unit
19. Quantity
20. Unit price
21. Amount of money
22. [illegible]
23. Mesh sheet part aging
24. Crack explosion treatment, etc.
25. High-pressure water washing, water pressure 75-120 kg/m²
26. Aqueous epoxy group protective adjusting material +
urethane resin paint

- 27. Aqueous epoxy protective adjusting material + urethane resin paint
- 28. Sand wall-shaped paint
- 29. No. A
No. B

Figure 15:

- 1. Unit: 10,000 yen
- 2. Repair plan proposer
- 3. Repair plan preparer
- 4. Year
- 5. Repair expense
- 6. Repair expense total
- 7. Year

Figure 16:

- 1. Unit: 10,000 yen
- 2. Repair plan proposer
- 3. Repair plan preparer
- 4. Year
- 5. Repair expense
- 6. Repair expense total
- 7. Lay-aside amount balance

8. Year

Figure 17:

1. Unit: 10,000 yen
2. Repair plan proposer
3. Repair plan preparer
4. Year
5. Repair expense
6. Repair expense total
7. Lay-aside amount balance
8. Year

Figure 19:

1. Written designated part, designated specification quantity
specification statement
2. Construction work name: Outer wall and other repair
construction works
3. Name
4. Specification
5. Confirm part, specification, and quantity in the field by
an additional specification and a reference drawing
6. Unit
7. Quantity

8. Penthouse

Penthouse outer wall,

Penthouse outer wall [illegible]

Penthouse outer wall, undercoat repair

Penthouse outer wall, undercoat repair

Penthouse outer wall, high-pressure water washing

Penthouse outer wall [illegible]

9. (1) Undercoat repair projection and adjustment construction work

(2) General wall coating construction work

10. Penthouse [illegible]

11. Penthouse [illegible]

12. Specification based on your company quantity

13. Mesh sheets, etc.

14. Crack explosion treatment, etc.

15. Diagnosis, check

16. High-pressure water washing, water pressure of 100 kg/cm² or more

17. Elastic filler + elastic acryl silicon resin paint

18. Special impregnated reinforced sealer + fine elastic protective adjusting material

19. Elastic acryl silicon resin paint for construction

20. Elastic filler + elastic acryl silicon resin paint

21. Special impregnated reinforced sealer + fine elastic protective adjusting material
22. Elastic acryl silicon resin paint for construction
23. Sand wall-shaped paint

Figure 20:

1. Estimate specification table
2. Construction work name
3. Outer wall and other repair construction works
4. Name
5. Specification
6. Unit
7. Quantity
8. Unit price
9. Amount of money
10. Direct temporary construction work
11. Penthouse
12. Penthouse outer wall [illegible]
13. Mansard relation
14. Mansard outer wall [illegible]
15. Roof parapet relation
16. Parapet [illegible]
17. Specification based on your company quantity

18. Construction work specification D, temporary construction work 11) [illegible]
19. Specification based on your company quantity
20. Construction work specification D, temporary construction work 11) [illegible]
21. Specification based on your company quantity
22. Construction work specification D, temporary construction work 11) [illegible]
23. Temporary installation area

Figure 22:

1. Flow chart of undercoat repair construction work
2. * May also be during the undercoat repair construction work
- e1 Entire construction work area
- e2 Diagnosis and check work
- e3 Crack floating treatment, etc.
Specification code
- e4 Crack explosion treatment, etc.
Specification code
- e5 Crack standard treatment method
- e6 Floating standard treatment method
- e7 Loss part standard treatment part
- e8 Exposed loss part standard treatment method

- e9 High-pressure water washing
Specification code
- e10 Undercoat reinforcing projection and adjustment
construction work or coating construction work

Figure 23:

1. Crack standard treatment method
 2. Specification code
Specification code
 3. However, if the crack width is 0.3 mm or smaller and a
protective adjusting material is used, this treatment is
not applied.
 4. However, if the crack width is thick and the change is
expected by the temperature difference, an epoxy resin is
not injected.
- f1 Rupture of treatment range
 - f2 Crack of 1 mm or greater
 - f3 Epoxy injection, within 300 mm
 - f4 U cut treatment
 - f5 Primer spread
 - f6 Crack of 0.5-1 mm
 - f7 U cut treatment
 - f8 Primer spread

- f9 Crack of 0.5 mm or smaller
- f10 Acryl urethane group chalking or modified silicon chalking
- f11 Polymer cement group fine elastic filler treatment
- f12 If necessary, pattern restoration

Figure 24:

- 1. Crack standard treatment method
- 2. Specification code
Specification code
- 3. Crack of 1 mm or greater
- 4. Crack of 1 mm or greater
- 5. Injection port
- 6. Within 300 mm
- 7. Epoxy resin injection
- 8. U cut
- 9. Primer spread
- 10. Acryl urethane group chalking or modified silicon chalking
- 11. Polymer cement group fine elastic filler treatment
- 12. Crack of 0.5-1 mm
- 13. U cut
- 14. Primer spread
- 15. Acryl urethane group chalking or modified silicon chalking
- 16. Polymer cement group fine elastic filler treatment

17. Crack of 0.5 mm or smaller
18. Polymer cement group fine elastic filler treatment
19. Designated products equivalent to epoxy resin
 - SSS bond #1000
 - Bond E20G
 - Asahi bond 371
20. Designated products equivalent to chalking material
 - Bond AU seal (primer #7)
 - Modified silicon cork (primer #9)
 - Hamatite Super 1 (primer N040)
 - Penguin sal 2550 HM (primer HM-3)
21. Designated products equivalent to polymer cement group fine elastic filler
 - Ares rubber filler M
 - Dan filler

Figure 25:

1. Undercoat reinforcing projection and adjustment construction work
2. Construction work name
3. Construction specification: High elastic protective adjusting material + acryl silicon resin

- (1) Undercoat reinforcing protection and adjustment
construction work, special impregnated reinforcing sealer +
high elastic protective adjusting material
Concrete special impregnated reinforcing sealer 1, spread
once + polymer cement group high elastic protective
adjusting material, spread twice
4. Outer wall and other repair construction works
 5. Specification code
 6. Process
 7. Paint name
 8. Spread times
 9. Standard spread amount
 10. Recoating drying time
 11. [illegible]
[illegible] rate (%)
 12. Coating method
 13. [illegible]
 14. * After removing [illegible], dust, and stains according to
the item of the estimation (undercoat repair construction
work (30-7, 30-3)) (high-pressure water washing),
patterning is applied, if necessary.
 15. Undercoat reinforcement
 16. Concrete special impregnated reinforcing sealer 1

17. 3 h or more
18. Bristle and intermediate hair wool roller
19. Undercoat [illegible]
20. Polymer cement group high elastic protective adjusting material
21. 16 h-7 days
22. Porous roller
23. Specification range

The construction work range of construction work specification, high elastic protective adjusting material + acryl silicon resin (1) undercoat reinforcing protection and adjustment construction work, special impregnated reinforcing sealer + high elastic protective adjusting material is process 2, from the undercoat reinforcement to process 3, up to the undercoat protection and adjustment. Also, process 1 and [illegible] is undercoat repair construction work specification, air blow cleaning, (30-7), high-pressure water washing, water pressure of 100-150 kg/m² (30-8).

Designated products equivalent to each company

<Undercoat reinforcing material>

A company Rikon CWS

B company Miracle LI

<Undercoat protective adjusting material>

C company, Cintrameron #200

B company Ares elastic rubber C

Construction work parts: (.) shows a part code.

Penthouse - penthouse parapet [illegible] (1-15)

Roof parapet relation - parapet outer wall [illegible] (3-4), parapet [illegible] (3-10), exhaust [illegible] (hot small room) [illegible] (3-67), roof balcony parapet [illegible] (3-203), roof balcony [illegible] (3-204)

External parts - dust site parapet [illegible] (10-201)